1SMB3EZ11 THRU 1SMB3EZ200

SURFACE MOUNT SILICON ZENER DIODE

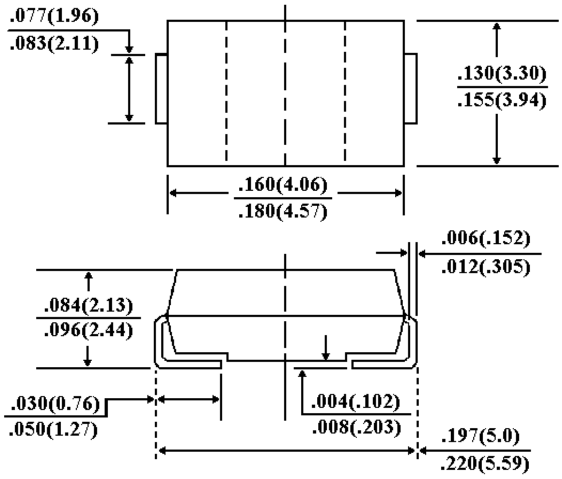
VOLTAGE - 11 TO 200 Volts   Power - 3.0 Watts

FEATURES

- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- Typical I_D less than 1 £gA above 11V
- High temperature soldering : 260 ¢J/10 seconds at terminals
- Plastic package has Underwriters Laboratory Flammability Classification 94V-O

DO-214AA

MODIFIED J-BEND



Dimensions in inches and (millimeters)

MECHANICAL DATA

Case: JEDEC DO-214AA, Molded plastic over passivated junction

Terminals: Solder plated, solderable per MIL-STD-750, method 2026

Polarity: Color band denotes positive end (cathode) except Bidirectional

Standard Packaging: 12mm tape(EIA-481)

Weight: 0.003 ounce, 0.093 gram

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 ¢J ambient temperature unless otherwise specified.

	SYMBOL	VALUE	UNITS
Peak Pulse Power Dissipation (Note A) Derate above 75 ¢J	P_D	3 24	Watts mW/¢J
Peak forward Surge Current 8.3ms single half sine-wave superimposed on rated load(JEDEC Method) (Note B)	I_{FSM}	15	Amps
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 to +150	¢J

NOTES:

A. Mounted on 5.0mm^2(.013mm thick) land areas.

B. Measured on 8.3ms, single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

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ELECTRICAL CHARACTERISTICS (T_A=25 ¢J unless otherwise noted) V_F=1.2 V max , I_F=500 mA for all types

Type No. (Note 1.)	Nominal Zener Voltage Vz @ I_{ZT} volts (Note 2.)	Test current I_{ZT} mA	Maximum Zener Impedance (Note 3.)			Leakage Current		Maximum Zener Current I_{ZM} Madc	Surge Current @ T_A = 25 ¢J ir - mA (Note 4.)	Device Marking Code
			Z_{ZT} @ I_{ZT} Ohms	Z_{Zk} @ I_{ZK} Ohms	I_{ZK} mA	I_R £g A Max @	V_R Volts			
1SMB3EZ11	11	68	4	700	0.25	1	8.4	225	1.82	11B
1SMB3EZ12	12	63	4.5	700	0.25	1	9.1	246	1.66	12B
1SMB3EZ13	13	58	4.5	700	0.25	0.5	9.9	208	1.54	13B
1SMB3EZ14	14	53	5	700	0.25	0.5	10.6	193	1.43	14B
1SMB3EZ15	15	50	5.5	700	0.25	0.5	11.4	180	1.33	15B
1SMB3EZ16	16	47	5.5	700	0.25	0.5	12.2	169	1.25	16B
1SMB3EZ17	17	44	6	750	0.25	0.5	13	150	1.18	17B
1SMB3EZ18	18	42	6	750	0.25	0.5	13.7	159	1.11	18B
1SMB3EZ19	19	40	7	750	0.25	0.5	14.4	142	1.05	19B
1SMB3EZ20	20	37	7	750	0.25	0.5	15.2	135	1	20B
1SMB3EZ22	22	34	8	750	0.25	0.5	16.7	123	0.91	22B
1SMB3EZ24	24	31	9	750	0.25	0.5	18.2	112	0.83	24B
1SMB3EZ27	27	28	10	750	0.25	0.5	20.6	100	0.74	27B
1SMB3EZ28	28	27	12	750	0.25	0.5	21	96	0.71	28B
1SMB3EZ30	30	25	16	1000	0.25	0.5	22.5	90	0.67	30B
1SMB3EZ33	33	23	20	1000	0.25	0.5	25.1	82	0.61	33B
1SMB3EZ36	36	21	22	1000	0.25	0.5	27.4	75	0.56	36B
1SMB3EZ39	39	19	28	1000	0.25	0.5	29.7	69	0.51	39B
1SMB3EZ43	43	17	33	1500	0.25	0.5	32.7	63	0.45	43B
1SMB3EZ47	47	16	38	1500	0.25	0.5	35.6	57	0.42	47B
1SMB3EZ51	51	15	45	1500	0.25	0.5	38.8	53	0.39	51B
1SMB3EZ56	56	13	50	2000	0.25	0.5	42.6	48	0.36	56B
1SMB3EZ62	62	12	55	2000	0.25	0.5	47.1	44	0.32	62B
1SMB3EZ68	68	11	70	2000	0.25	0.5	51.7	40	0.29	68B
1SMB3EZ75	75	10	85	2000	0.25	0.5	56	36	0.27	75B
1SMB3EZ82	82	9.1	95	3000	0.25	0.5	62.2	33	0.24	82B
1SMB3EZ91	91	8.2	115	3000	0.25	0.5	69.2	30	0.22	91B
1SMB3EZ100	100	7.5	160	3000	0.25	0.5	76	27	0.2	100B
1SMB3EZ110	110	6.8	225	4000	0.25	0.5	83.6	25	0.18	110B
1SMB3EZ120	120	6.3	300	4500	0.25	0.5	91.2	22	0.16	120B
1SMB3EZ130	130	5.8	375	5000	0.25	0.5	98.8	21	0.15	130B
1SMB3EZ140	140	5.3	475	5000	0.25	0.5	106.4	19	0.14	140B
1SMB3EZ150	150	5	550	6000	0.25	0.5	114	18	0.13	150B
1SMB3EZ160	160	4.7	625	6500	0.25	0.5	121.6	17	0.12	160B
1SMB3EZ170	170	4.4	650	7000	0.25	0.5	130.4	16	0.12	170B
1SMB3EZ180	180	4.2	700	7000	0.25	0.5	136.8	15	0.11	180B
1SMB3EZ190	190	4	800	8000	0.25	0.5	144.8	14	0.1	190B
1SMB3EZ200	200	3.7	875	8000	0.25	0.5	152	13	0.1	200B

NOTES:

1. TOLERANCES - Suffix indicates 5% tolerance any other tolerance will be considered as a special device.
2. ZENER VOLTAGE (Vz) MEASUREMENT - guarantees the zener voltage when measured at 40 ms ¡Ó10ms from the diode body, and an ambient temperature of 25 ¢J (¡Ï 8 ¢J, -2 ¢J).

3.ZENER IMPEDANCE (Zz) DERIVATION - The zener impedance is derived from the 60 cycle ac voltage, which results when an ac current having an rms falue equal to 10% of the dc zener current (I_{ZT} or I_{ZK}) is superimposed on I_{ZT} or I_{ZK}.

4. SURGE CURRENT (Ir) NON-REPETITIVE - The rating listed in the electrical characteristics table is maximum peak, non-repetitive, reverse surge current of 1/2 square wave or equivalent sine wave pulse of 1/120 second duration superimposed on the test current, I_{ZT}, per JEDEC standards, however, actual device capability is as described in Figure 3.

RATING AND CHARACTERISTICS CURVES
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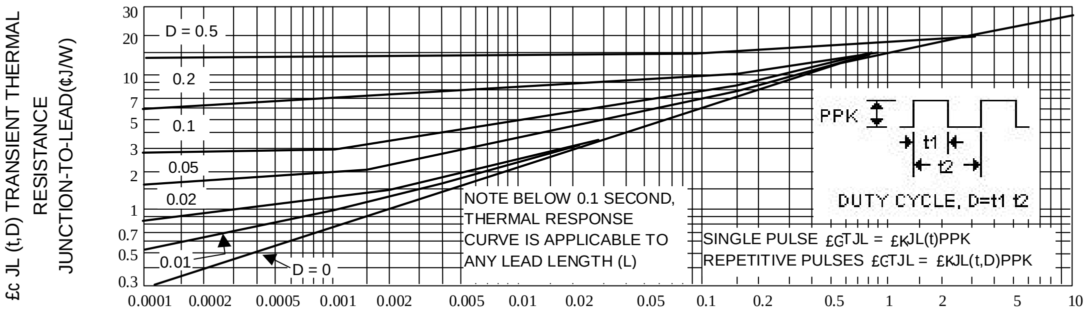


Fig. 2-TYPICAL THERMAL RESPONSE L,

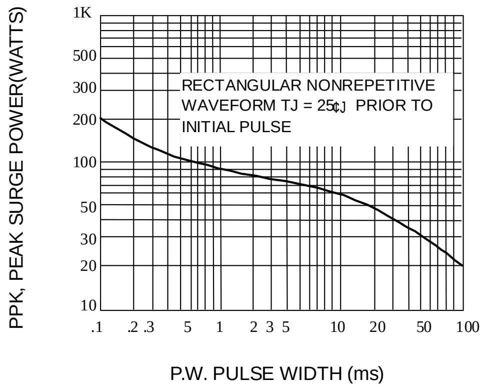


Fig. 3-MAXIMUM SURGE POWER

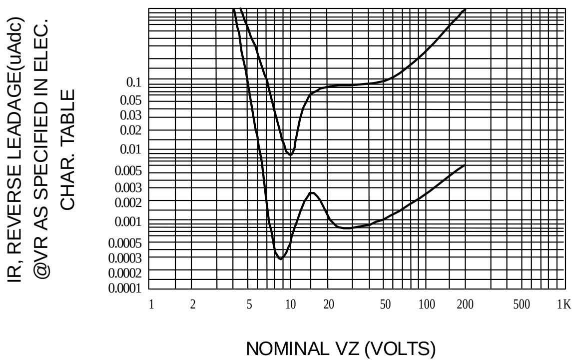


Fig. 4-TYPICAL REVERSE LEAKAGE

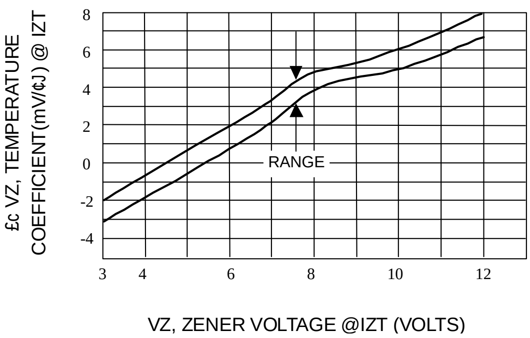


Fig. 5-UNITS TO 12 VOLTS

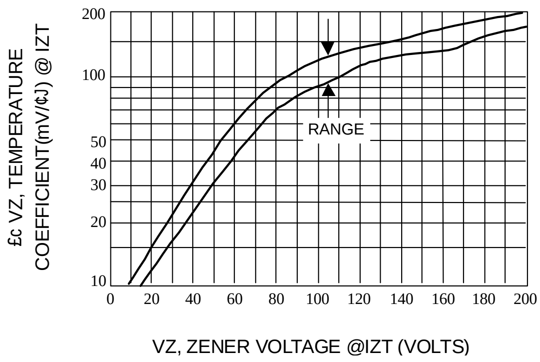


Fig. 6-UNITS 10 TO 200 VOLTS

RATING AND CHARACTERISTICS CURVES

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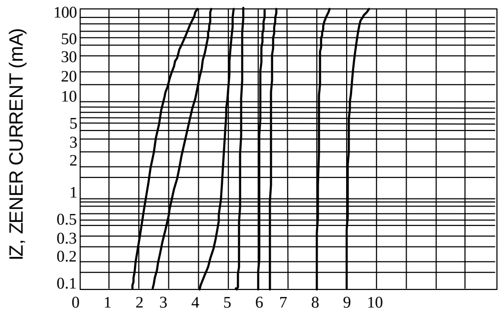


Fig. 7-VZ = 3.9 THRU 10 VOLTS

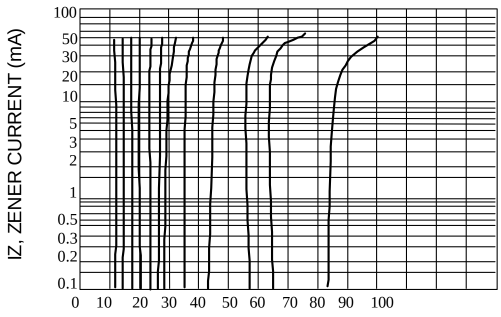


Fig. 8-VZ = 12 THRU 82 VOLTS

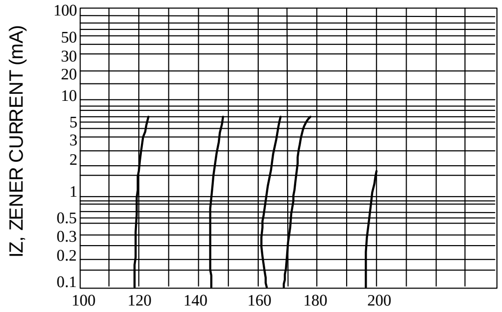


Fig. 9-VZ = 100 THRU 200 VOLTS

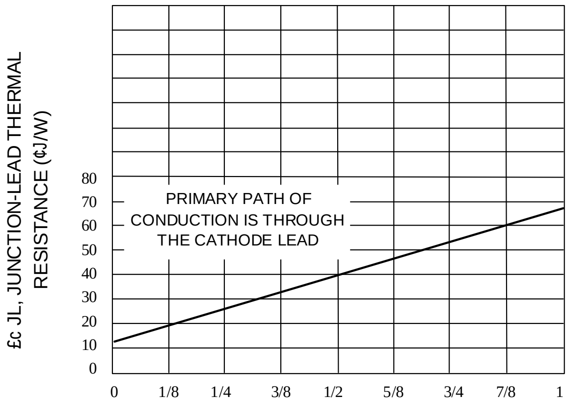


Fig. 10-TYPICAL THERMAL RESISTANCE

APPLICATION NOTE:

Since the actual voltage available from a given zener diode is temperature dependent, it is necessary to determine junction temperature under any set of operating conditions in order to calculate its value. The following procedure is recommended:

Lead Temperature, T_L, should be determined from:

$$TL = £c_{LA}P_D + T_A$$

£c$_{LA}$ is the lead-to-ambient thermal resistance (¢J/W) and P_D is the power dissipation. The value for £c$_{LA}$ will vary and depends on the device mounting method.

£c$_{LA}$ is generally 30-40 ¢J/W for the various chips and tie points in common use and for printed circuit board wiring.

The temperature of the lead can also be measured using a thermocouple placed on the lead as close as possible to the tie point. The thermal mass connected to the tie point is normally large enough so that it will not significantly respond to heat surges generated in the diode as a result of pulsed operation once steady-state conditions are achieved. Using the measured value of T_L, the junction temperature may be determined by:

$$T_J = T_L + £GT_{JL}$$

£GT_{JL} is the increase in junction temperature above the lead temperature and may be found from Figure 2 for a train of power pulses or from Figure 10 for dc power.

$$£GT_{JL} = £c_{LA}P_D$$

For worst-case design, using expected limits of Iz, limits of P_D and the extremes of T_J (£GT_{JL}) may be estimated. Changes in voltage, Vz, can then be found from:

$$£GV = £c_{VZ}\ £GT_J$$

£c$_{VZ}$, the zener voltage temperature coefficient, is found from Figures 5 and 6.

Under high power-pulse operation, the zener voltage will vary with time and may also be affected significantly be the zener resistance. For best regulation, keep current excursions as low as possible.

Data of Figure 2 should not be used to compute surge capability. Surge limitations are given in Figure 3. They are lower than would be expected by considering only junction temperature, as current crowding effects cause temperatures to be extremely high in small spots resulting in device degradation should the limits of Figure 3 be exceeded.